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EXPERIMENTAL RESULTS ON THE USE OF VINASA CLARIANT ORGANIC FERTILIZER IN WHEAT CROP

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Abstract
In the current conditions in the technology of wheat crop, more and more either fertilizers with the lowest possible concentrations of active ingredients or organic fertilizers are being promoted. These new requirements are also in line with current European fertilization rules.
This paper presents new results by comparing an organic fertilizer with conventional fertilizer systems. The organic fertilizer researched proved to be very effective in the production of total biomass, spicke/ear biomass, grain biomass and MTG. In absolute terms, wheat produced over 11 tons of total biomass, over 6 tons of spike biomass (59%) and over 3 tons of grain (29%) all these results proved to be very close to the combination of urea and organic fertilizer and respectively superior to urea applied alone.
The results obtained are recommended for the promotion of Vinasa Clariant in farm conditions.

Keywords: biomass, organic fertilization, wheat, Vinasa Clariant.

1. INTRODUCTION

Wheat is one of the most important crops in the world because of its many benefits. The plant enjoys special attention due to the high content of grains in active ingredients.
The gains obtained in the last period of time were due to the permanent improvement with the materialization through more and more efficient lines and varieties. The degree of adaptability to different areas of culture was also taken into account. For the crop area in the station, good results were obtained regarding the resistance of new wheat varieties to soil acidity. This is also the case with the Trivale variety, which has improved characters. Thus, the variety is distinguished by: plant height of 70-76 cm, spike is 9 cm and a weight of 2.1-2.4 g, and the mass of one thousand grains (MTG) is 41-43 g.
In order to achieve high yields for the Trivale variety, it is necessary to ensure modern fertilization, sowing at the optimum time (October 1-10) and a corresponding density.
The aim of the research was to investigate the effectiveness of an accepted fertilizer for organic farming, namely: Vinasa Clariant, in the conditions of the station and to compare their effect on production performance of winter wheat.
Vinasa Clariant fertilizer is obtained by a Swiss process from wheat straw, being improved with fertilizing elements. Soluble in water, it is applied in liquid form directly on the wheat crop. Distribution in the field is done with the herbicide machine provided with a ramp-type device with

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holes, as close as possible to the surface of the soil and the plants, respectively on the young wheat plants.
The fertilizer provides an optimal regime for stimulating the plants throughout the growing season. In the variants, the fertilizer Vinasa Clariant contributed to the obtaining of increases materialized by: the total biomass, the production of ears and the yildes of grains, which showed a good efficiency at this crop plant.

2. MATERIALS AND METHODS

The Trivale wheat variety was cultivated in 2019-2020 according to the technology recommended by the station. The experiment was performed according to the method of blocks with variants with an area of 40 m² (5 x 8 m) in 3 repetitions.
The experimental variants were the following:

- V1-Urea (46% nitrogen content)
- V2-Urea + Vinasa Clariant
- V3-Vinasa Clariant (N 1.52%, P_2O_5 0.40%, K_2O 7.37%, MgO 0.27%, S 0.32% organic matter 34.3 %)
- V4-Check plot

Wheat plants were subjected to a series of determinations on: total biomass (total.s.u); ear biomass; grain biomass and mass of one thousand grains (MTG). On the obtained grains, calculations were made regarding the analysis of variance (Anova test), as well as simple correlations in order to observe the trends in the experiment. Depending on the experimental variants, the fertilizers applied in specific quantities amounted to levels considered to be optimal. Their application was made in 3 moments from the young period of the wheat, respectively after the wheat sprouting (first application), the second application to the tillering, and the third application before the elongation of the wheat stalks - table 1.

Table 1. Fertilization system of wheat crop

Fertilizer dosage variant	Vinasa Clariant, t/ha	Urea kg / ha	Application 1-autumn 2-winter / spring 3-spring Phases of vegetation	Sowing 2-BBCH 21 3-BBCH 37
V1	0	70 70 70	Yes	Yes
V2	3.0 4.0 5.0	40 50 60	Yes	Yes
V3	3.9 4.0 5.0	0	Yes	Yes
V4	0	0	Check plot	Unfertilized

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3. RESULTS AND DISCUSSIONS

1. Climatic characterization of wheat vegetation

From a climatic point of view, S.C.D.A Pitești is located in an area with temperate-continental climate with multiannual values of 10-11°C and 700 mm of rainfall. Between October 2019 and June 2020, temperatures and rainfall were monitorized like their influence on wheat plants.

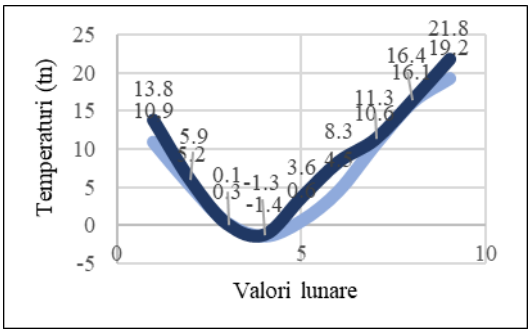

Figure 1. The evolution of temperature

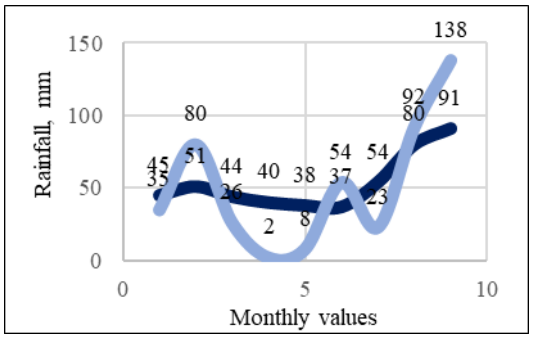

Figure 2. The evolution of precipitation

1 – October; 2 – November; 3 – December; 4- January; 5- February; 6- March; 7- April; 8- May; 9- June.

Regarding the temperatures, there is an approximately normal evolution in autumn, when the wheat has raized and make tillerss. When the vegetation resumes in March - April the values have evolved to slightly higher levels than normal (figure 1). During the deposition of nutrients in the grains were recorded at a temperature of 2-3°C more. The rain falls had a large variability by up and down multiannuals values (figure 2).

2. The fertilization influence on wheat production

Compared to the experimental control that produced 8293 kg/ha, the other variants formed an additional total biomass, differentiated being very significant in the combined version urea + Vinasa Clariant. The grain biomass obtained was similarly between 2363 kg/ha and 4540 kg/ha, as extreme values. The combination of Urea Vinasa Clariant provided a significant average increase grain production (table 2).

Table 2. The influence of fertilizers on wheat production

Nr.	Treatment variants	Total biomass, Kg/ha	Total biomass, %	Spike biomass, Kg/ha	Spice biomass, %	Grain biomass, Kg/ha	Grain biomass, %	MTG, gr
1	Check plot	8293.0	100.00	4800.0	57.8	2363.0	28.4	35.0
2	Urea	**10173.0**	100.00	**5947.0**	58.4	3704.0	36.4	37.7
3	Urea + Vinasa	**12640.0**	100.00	**7360.0**	58.2	**4540.0**	35.9	38.6
4	Vinasa Clariant	**11187.0**	100.00	**6573.0**	58.7	3225.0	28.8	37.8
LSD 5% LSD 1% LSD 0.1%		1061.6 1608.2 2585.2		910.6 1379.4 2217.5		1388.0 2102.0 3379.0		3.3 5.0 8.1

Regarding the spike biomass formed, it was found that it represented between 57.8 (check plot) and the highest value 58.7 (Vinasa Clariant). The treatment with Vinasa Clariant is noticeable, which

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had the highest proportion of the total wheat biomass. Grain biomass represented 28.4% in the case of unfertilized plot and 36.4% in the case of urea. It is generally found that winter wheat fertilized under the conditions of the experiment showed high proportions in both the formation of ears and grains.
The Mass of one Thousand Grains (MTG) as the main component studied was between 35.0 g and 38.6 g, in the whole experiment. The average values obtained were within the error limit.

Table 3. Correlations between the characteristics of wheat plants

	Total biomass	Spike biomass	Grain biomass	MTG
Total biomass	1	0.979	0.795	0.660
Spike biomass		1	0.829	0.665
Grain biomass			1	0.482
MTG				1
LSD 5% = 0.19 LSD 1% = 0.25 LSD 0.1% = 0.32				

The fertilization provided in the experiment favored very significant correlations between all the characters (table 3). The data obtained show that all the variants investigated responded very favorably, namely from control to urea, Vinasa Clariant and the combination of them**.**

3. Corellation between the many characters

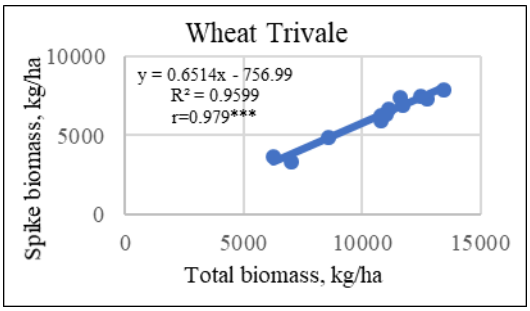

Figure 3. The correlation between total biomass and spice biomass

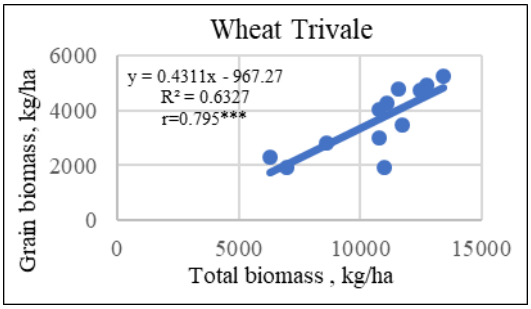

Figure 4. The correlation between total biomass and grain biomass

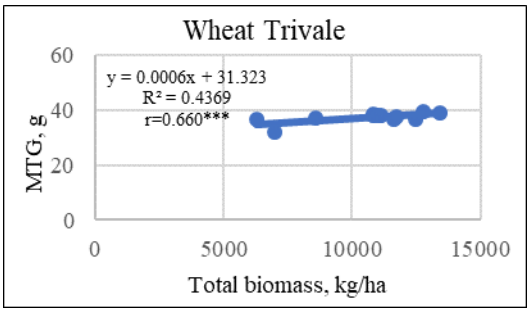

Figure 5. Correlation between total biomass and MTG

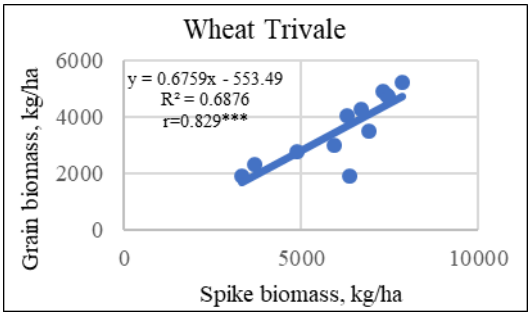

Figure 6. The correlation between spice biomass and grain biomass

The correlation between the first two characters studied, respectively, between the total biomass and the spike biomass was positive and very significant. The graph shows that at 6000 -7000 kg/ha of total wheat biomass, between 3000-4000 kg/ha of spike biomass was formed. The highest values of

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the correlation showed that by fertilization to a total biomass of 13000 kg/ha formed approximately 8000 kg/ha (figure 3).
A very significant correlation was established between the total biomass of wheat plants in the whole experiment and grain biomass, but at slightly lower values (r = 0.795). One of the causes is the fact that in some variants with fertilization, the amount of grains was lower due to lower concentrations of active ingredients. One of the positive and very significant correlations is between the biomass of the ears and the biomass of the grains. A cause of the dispersion of the points to the right is caused by a certain degree of capitalization of the fertilizers (figure 4).
Regarding the causal link between the biomass of ears with MTG, the value has a statistically very positive assurance with a relatively low slope of values (figure 5). The direct link between ear biomass and grain biomass is very well ensured statistically (r = 0.829 ***). This demonstrates a very close dependence on the expression of the two characters (figure 6).

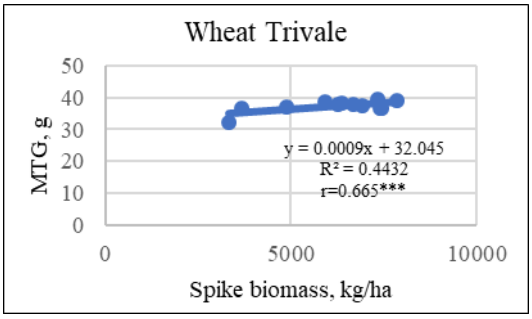

Figure 7. The correlation between spice biomass and MMB

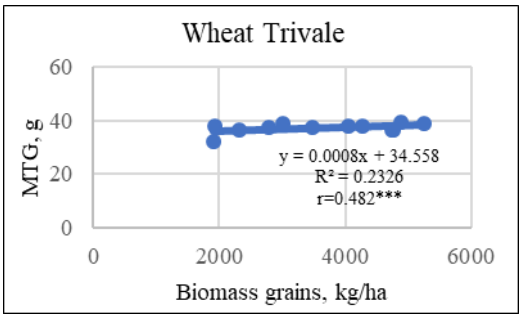

Figure 8. The correlation between grain biomass and MMB

Regarding the mass of a thousand grains, there is a relative uniformity, its values being between 35-40 g. One of the causes of the slight increase in MTG values is the period of drought during the grain filling, as well as other causes (figure 7 and figure 8).

4. CONCLUSIONS

1. In the present experiment, natural fertilizer Vinasa Clariant was promoted in order to provide for its use in production conditions. Being a rather complex product as a composition, it has fully proved its qualities as a fertilizer in the current conditions of environmental protection.
2. The production increases obtained in the fertilized variants proved to be high even in the case of the product Vinasa Clariant. The fertilization system used sought to bring the Vinasa Clariant product to the same level of effectiveness as the urea fertilizer.
3. The total wheat biomass was high considering the need to promote organic products at the level where competitive production increases are obtained. The data show that the product Vinasa Clariant applied according to the present technology can replace to some extent the high-performance chemical fertilizers (urea).
4. In view of the results obtained, we recommend the product Vinasa Clariant for fertilizing winter wheat with and without chemical fertilizers.

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